



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/663,807

09/17/2003

Eiji Hayashi

Q77558

4057

65565

7590

07/11/2008

SUGHRUE-265550

2100 PENNSYLVANIA AVE. NW

WASHINGTON, DC 20037-3213

EXAMINER

BOES, TERENCE

ART UNIT

PAPER NUMBER

3682

MAIL DATE

DELIVERY MODE

07/11/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/663,807	<b>Applicant(s)</b> HAYASHI, EIJI	
	<b>Examiner</b> TERENCE BOES	<b>Art Unit</b> 3682	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15, 23, 28, 29 and 33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15, 23, 28, 29 and 33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>11/16/2007, 03/17/2008</u> .                                | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-3, 7, 8, 9, 11-13, 15, 28, 29, 32, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 4-116051 in view of Rohlinger US 5,373,755.

JP 4-116051 discloses:

- a screw shaft (1) including a spiral-shaped ball rolling groove (1a) formed in an outer peripheral surface thereof;
- a nut (2) including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof;
- a plurality of balls (3) disposed in a ball rolling passage formed by the two ball rolling grooves;
- a ball circulation tube (5) forming a ball circulation passage and including a ball scooping portion (5a) in an end portion thereof,
- a tube guide insertion hole (2c) is formed on the nut at a position where the ball scooping portion is inserted,

- a tube guide made of resin (7, also see Japanese rejection) via which the ball circulation tube is mounted onto the nut.
- the tube guide (7) comprising: a top surface; a bottom surface; and a side surface connecting the top surface and the bottom surface (see figure 3, tube guide 7 has top and bottom surfaces and a cylindrical side surface),
- wherein a scooping portion insertion hole is formed so as to penetrate from the top surface to the bottom surface (see figure 3),
- the ball scooping portion is inserted into the scooping portion insertion hole (see figure 3),
- a tube guide insertion hole is formed on the nut at a position where the ball scooping is inserted (see figure 3).
- the side surface has a shape matched to an inner shape of a tube guide insertion hole (see figure 3),
- the scooping portion insertion hole has an inner shape matched to an outer shape of the ball scooping portion (see figure 3).
- wherein the side surface is formed in a cylindrical shape (see figures 1 and 3)
- wherein an axial line of the cylindrical shape is set perpendicular to an axial line of the nut (see figures 2 and 3)
- wherein the tube guide is made of elastic material (because all materials have a modulus of elasticity, the tube guide is made of an elastic material).

- wherein the tube guide is interposed between the ball scooping portion and the tube guide insertion hole without any clearance between the ball scooping portion and the tube guide insertion hole (see figure 3).
- Wherein the top surface is chamfered in a smooth arc manner (see figure 3, top surface is curved matching shape of radius in tube)
- Wherein the top surface of the tube guide and the installation surface are disposed on a same plane on both sides of the tube guide (see top surfaces of 2b and 2c in same plane)

JP 4-116051 discloses a ballscrew with a recirculation tube tube guide. JP 4-116051 does not disclose a tube guide interposed without any clearance. Rohlinger teaches a tube guide interposed without any clearance (see figure 4). Because both JP 4-116051 and Rohlinger teach ballscrews with recirculation tube tube guides, it would have been obvious to one having ordinary skill in the art at the time of the invention to substitute a ballscrew recirculation tube tube guide without clearance for a ballscrew recirculation tube tube guide with clearance to achieve the predictable result of recirculating balls within a ballscrew.

JP 4-116051 discloses a ballscrew with a recirculation tube tube guide. JP 4-116051 does not disclose an installation surface on which a lower surface of the ball circulation tube contacts. Rohlinger teaches an installation surface on which a lower surface of the ball circulation tube contacts (see figures 3 and 4). Because both JP 4-116051 and Rohlinger teach ballscrews with recirculation tube tube guides, it would

Art Unit: 3682

have been obvious to one having ordinary skill in the art at the time of the invention to provide an installation surface on which a lower surface of the ball circulation tube contacts to achieve the predictable result of recirculating balls within a ballscrew.

2. Claims 1-3, 7- 9, 11-13, 15, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conant 2,882,742 in view of Merkel US 3,379,643 and further in view of Rohlinger US 5,373,755.

Conant discloses:

- a screw shaft (10) including a spiral-shaped ball rolling groove (11) formed in an outer peripheral surface thereof;
- a nut (12) including a spiral-shaped ball rolling groove (13) formed in an inner peripheral surface thereof;
- a plurality of balls (16) disposed in a ball rolling passage formed by the two ball rolling grooves;
- a ball circulation tube (17) forming a ball circulation passage and including a ball scooping portion in an end portion thereof,
- a tube guide insertion hole is formed on the nut at a position where the ball scooping portion is inserted (see figure 6),
- a tube guide (35) via which the ball circulation tube is mounted onto the nut.

- the tube guide (35) comprising: a top surface; a bottom surface; and a side surface connecting the top surface and the bottom surface (see figure 6),
- wherein a scooping portion insertion hole is formed so as to penetrate from the top surface to the bottom surface (see figure 6),
- the ball scooping portion is inserted into the scooping portion insertion hole (see figure 6),
- a tube guide insertion hole is formed on the nut at a position where the ball scooping is inserted.
- the side surface has a shape matched to an inner shape of a tube guide insertion hole (see figure 6),
- the scooping portion insertion hole has an inner shape matched to an outer shape of the ball scooping portion (see figure 6).
- wherein the side surface is formed in a cylindrical shape (see figure 6)
- wherein an axial line of the cylindrical shape is set perpendicular to an axial line of the nut (see figure 6)
- wherein the tube guide is made of elastic material (because all materials have a modulus of elasticity, the tube guide is made of an elastic material).
- wherein the tube guide is interposed between the ball scooping portion and the tube guide insertion hole without any clearance between the ball scooping portion and the tube guide insertion hole (see figure 6).

Conant does not disclose resin.

Merkel teaches resin (C1/L24-35) for the purpose of increasing flexibility and magnetic strength while reducing the expense of rigid metallic magnets (C1/L24-35).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the teachings of Conant and provide a magnetic resin, as taught by Merkel, for the purpose of increasing flexibility and magnetic strength while reducing the expense of rigid metallic magnets.

JP 4-116051 discloses a ballscrew with a recirculation tube tube guide. JP 4-116051 does not disclose a tube guide interposed without any clearance. Rohlinger teaches a tube guide interposed without any clearance (see figure 4). Because both JP 4-116051 and Rohlinger teach ballscrews with recirculation tube tube guides, it would have been obvious to one having ordinary skill in the art at the time of the invention to substitute a ballscrew recirculation tube tube guide without clearance for a ballscrew recirculation tube tube guide with clearance to achieve the predictable result of recirculating balls within a ballscrew.

3. Claims 4-6, 10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 4-116051 in view of Rohlinger US 5,373,755 and further in view of Ebina et al. US 6,089,117.



JP 4-116051 in view of Rohlinger discloses all of the claimed subject matter as described above. JP 4-116051 in view of Rohlinger does not disclose wherein the scooping portion insertion hole has a ball circulation passage scooping angle set so as to correspond to the a lead angle of the ball screw.

Ebina et al. teach wherein the scooping portion insertion hole has a ball circulation passage scooping angle set so as to correspond to the a lead angle of a ball screw (see figure 8) for the purpose of achieving smooth circulation of balls (C16/L45-60).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the teachings of JP 4-116051 in view of Rohlinger and provide wherein the scooping portion insertion hole has a ball circulation passage scooping angle set so as to correspond to the a lead angle of a ball screw, as taught by Ebina et al., for the purpose of achieving smooth circulation of balls.

JP 4-116051 further discloses:

- wherein the tube guide is made of elastic material (because all materials have a modulus of elasticity, the tube guide is made of an elastic material).

4. Claims 4-6, 10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conant 2,882,742 in view of Merkel US 3,379,643, and further in view of Rohlinger US 5,373,755, and further in view of Ebina et al. US 6,089,117.

Conant discloses all of the claimed subject matter as described above. Conant does not disclose wherein the scooping portion insertion hole has a ball circulation passage scooping angle set so as to correspond to the a lead angle of the ball screw.

Ebina et al. teach wherein the scooping portion insertion hole has a ball circulation passage scooping angle set so as to correspond to the a lead angle of a ball screw (see figure 8) for the purpose of achieving smooth circulation of balls (C16/L45-60).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the teachings of Conant and provide wherein the scooping portion insertion hole has a ball circulation passage scooping angle set so as to correspond to the a lead angle of a ball screw, as taught by Ebina et al., for the purpose of achieving smooth circulation of balls.

Conant further discloses:

- wherein the tube guide is made of elastic material (because all materials have a modulus of elasticity, the tube guide is made of an elastic material).

5. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conant 2,882,742 in view of Merkel US 3,379,643, and further in view of Rohlinger US 5,373,755.

Conant discloses all of the claimed subject matter as described above. Conant does not disclose a chamfered top surface.

Rohlinger teaches a chamfered top surface (see figures 4 and 6 @ 41) for the purpose of closely supporting a circulation tube while allowing for a radius to smoothly guide balls (C6/L55-65), thus avoiding an abrupt change in ball direction and improving operational efficiency.

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the teachings of Conant and provide a chamfered top surface, as taught by Rohlinger, for the purpose of closely supporting a circulation tube while allowing for a radius to smoothly guide balls, thus avoiding an abrupt change in ball direction and improving operational efficiency.

### ***Response to Arguments***

6. Applicant's arguments with respect to claims 1-15, and 28-33 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

Art Unit: 3682

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TERENCE BOES whose telephone number is (571)272-4898. The examiner can normally be reached on Monday - Friday 9:00 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on (571) 272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/T. B./  
Examiner, Art Unit 3682  
7/7/08

/Richard WL Ridley/

Application/Control Number: 10/663,807

Page 12

Art Unit: 3682

Supervisory Patent Examiner, Art Unit 3682